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Designing a Better Planet?:
Climate Engineering Technologies and Their Legal Implications

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CODE GREEN
¡e!
I thought I was Napoleon. I tried to invade Russia.
I thought I could fly. I jumped off a building.
What about him?
He thought he could solve global warming with particle-spraying rockets and space mirrors.
©2009 Stephanie McMillan
¡e!

Climate Change and Diplomacy Discouragement

- Climate Change – a “Super Wicked” Problem
  - Requires collective action
  - Immediate sacrifice for remote gains by future generations
  - Justice and equity concerns (“climate debt”)

- Not surprisingly, difficult to achieve consistent and coordinated action
  - Waxman-Markey
  - Copenhagen Accords
  - International accord or significant domestic action unlikely for near future

- Some have proposed geoengineering or climate engineering as an important fall-back strategy

Geoengineering - “Plan B”?

- Geoengineering is

  the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change

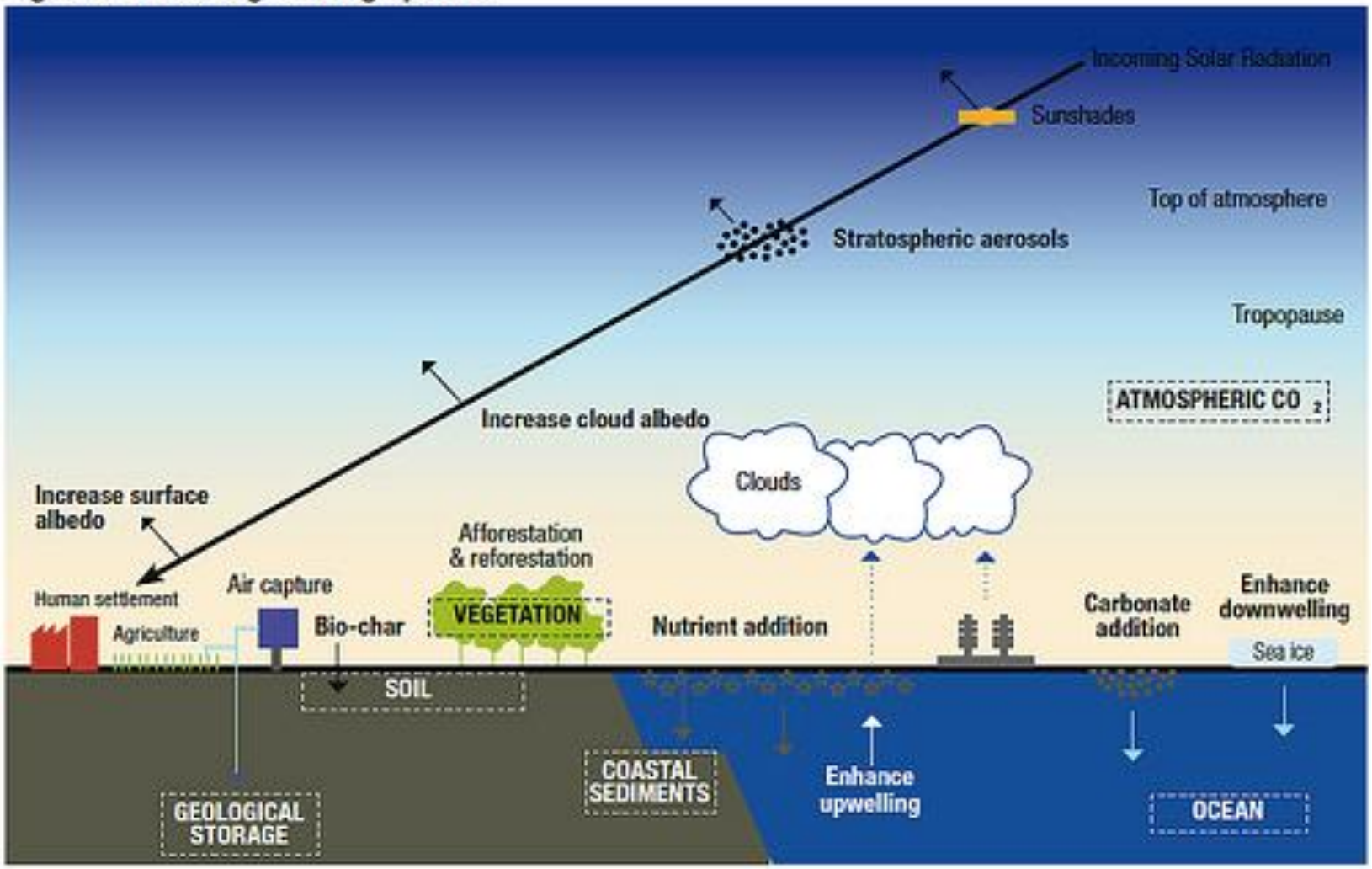
- Treated as a fringe subject for decades, and still highly controversial

- Key point: proposal by Dr. Paul Crutzen in 2006

Types of Climate Engineering

- Solar Radiation Management
- Carbon Dioxide Removal
- Sink Temperature Management
- Regional Chemical Strategies

Figure 5.4: Geoengineering options



Solar Radiation Management

- Focus on reducing the amount of solar energy reaching the Earth's surface

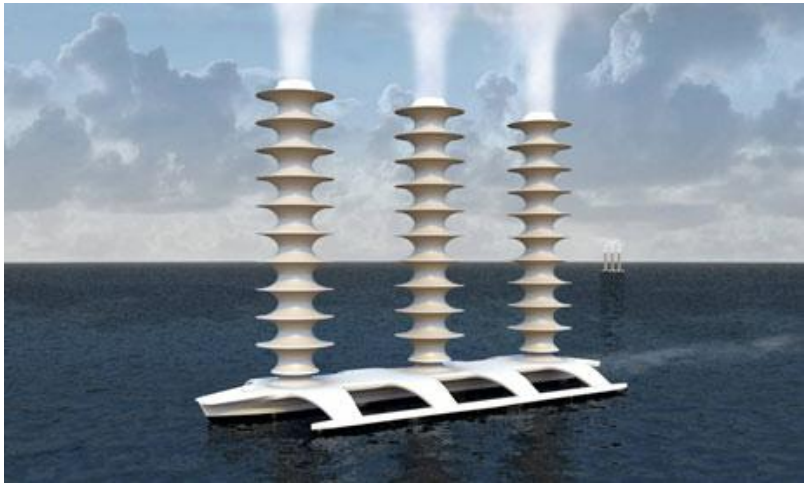
- Key examples

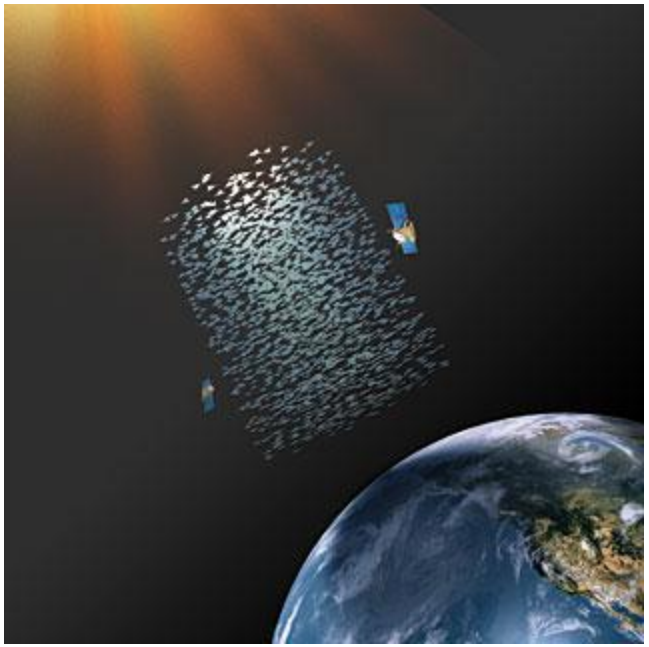
  - Stratospheric aerosol releases
  - Cloud whitening
  - Surface albedo enhancement
  - Satellite reflectors

Stratospheric Aerosol Releases

- Mimic global cooling caused by volcanic eruptions
- Effectiveness: half-ounce of SO_2 offsets one ton of CO_2
  global temperatures reduced to 2 degrees C
- Requirements: 5 million tons of SO_2 annually
  $1 billion to $50 billion annually

Other Solar Radiation Management Options



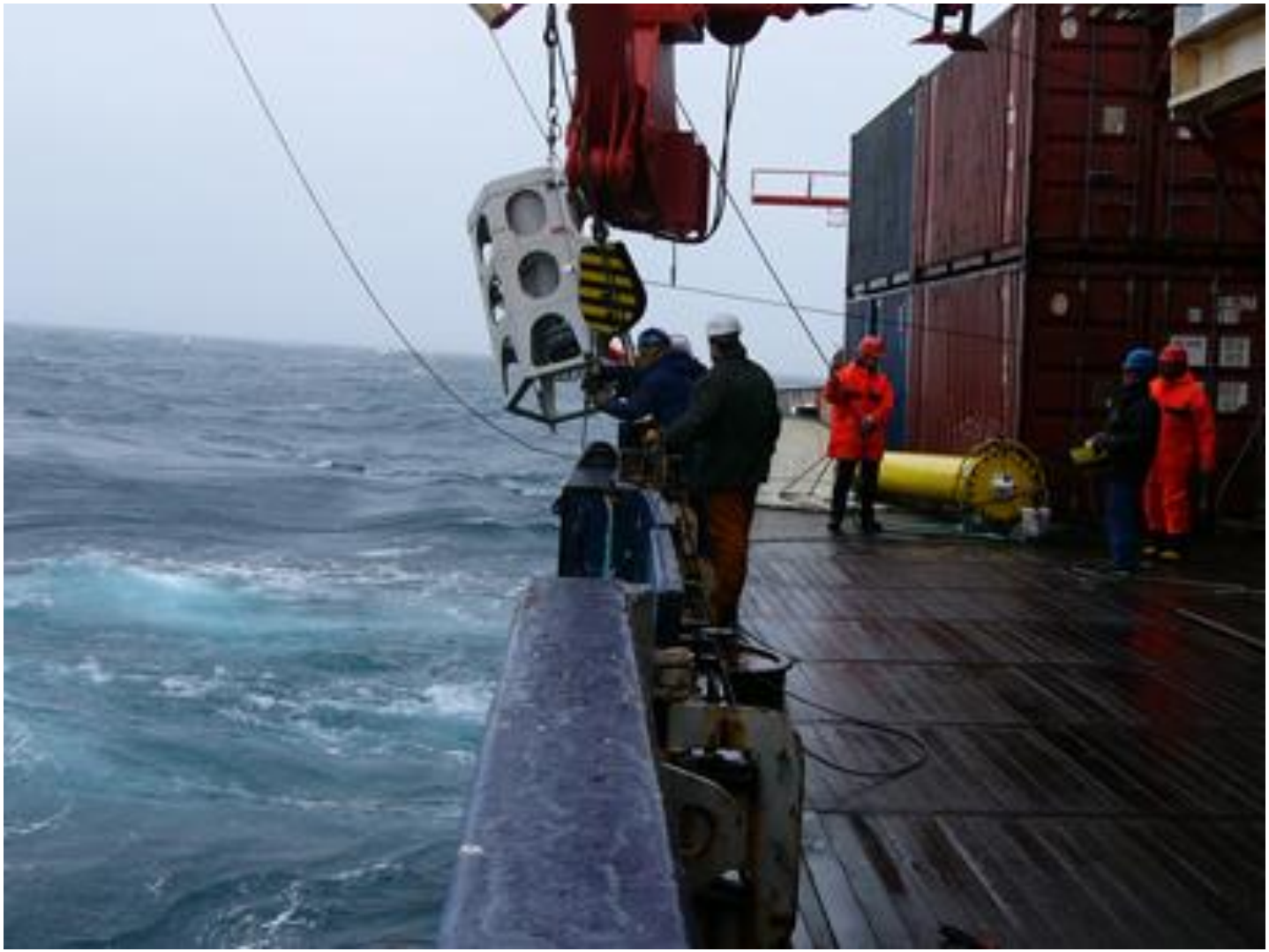


Carbon Dioxide Management

- Enhance absorption of carbon dioxide and other greenhouse gases from atmosphere

- Techniques:

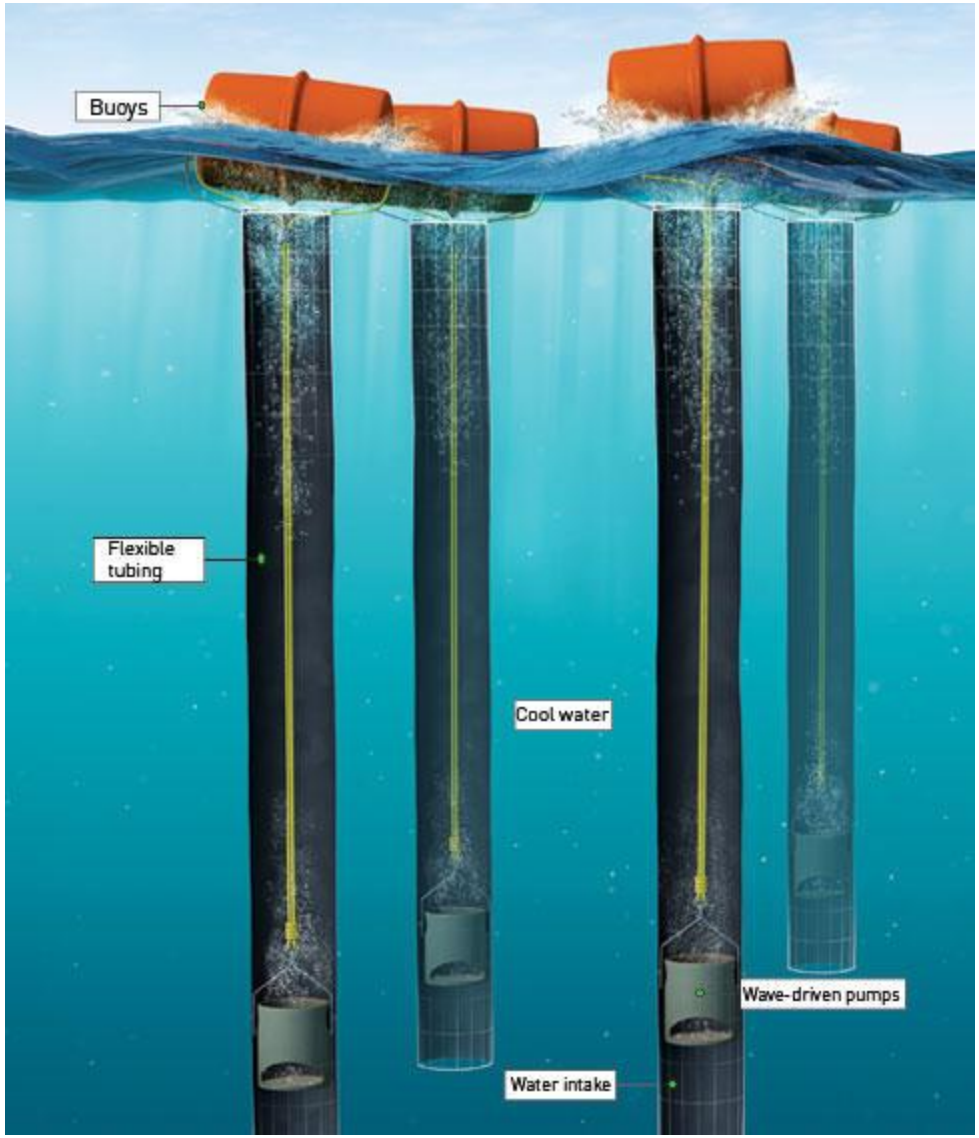
  - Afforestation
  - Ocean fertilization
  - Mechanical removal of CO2
  - Biochar



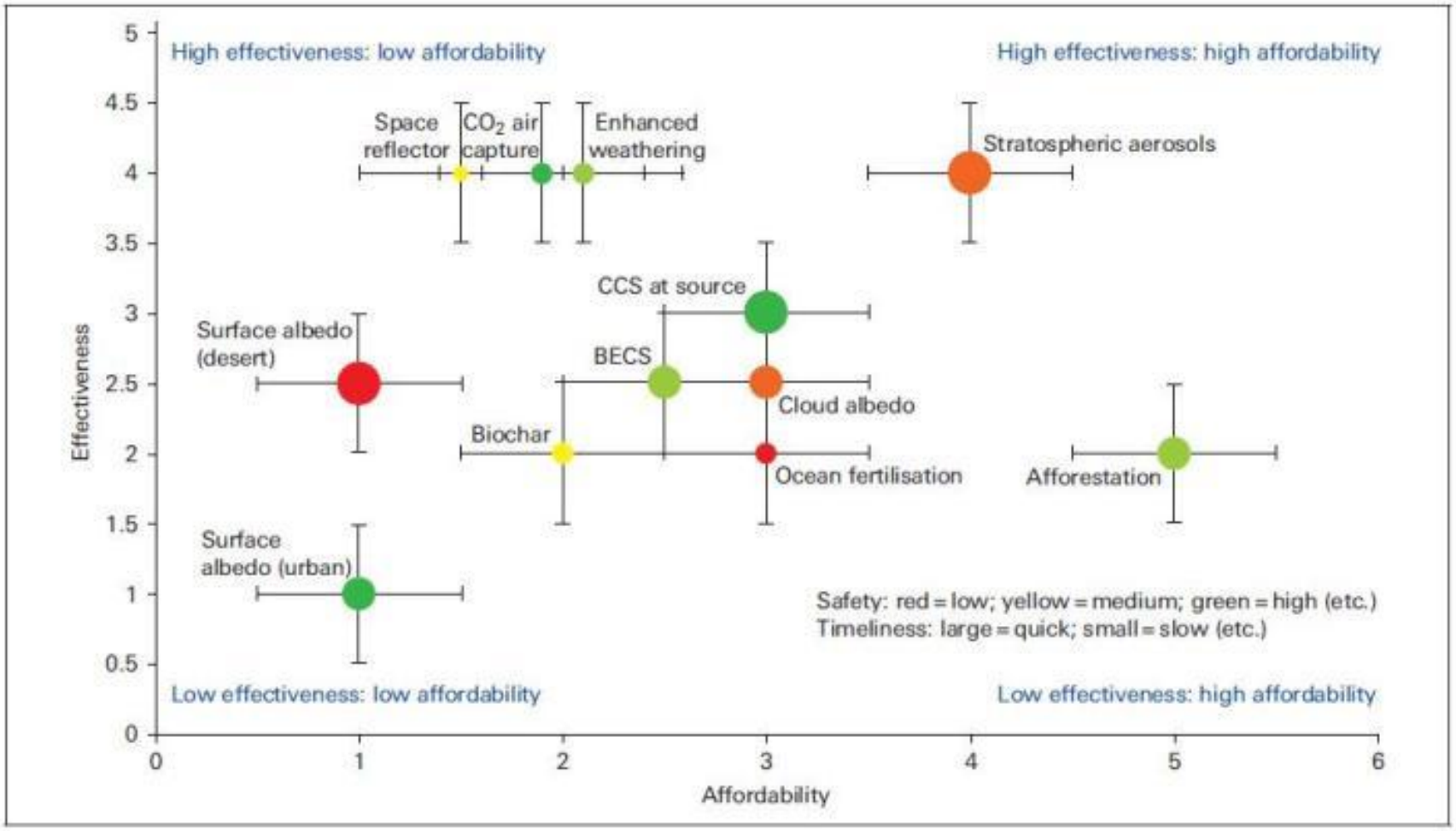

Elevator
Filter loaded with CO_2
Clean filter
Regeneration chamber
Loaded filter
Compressor
Water tank
CO_2 tank
Drain

Heat Sink Temperature Management

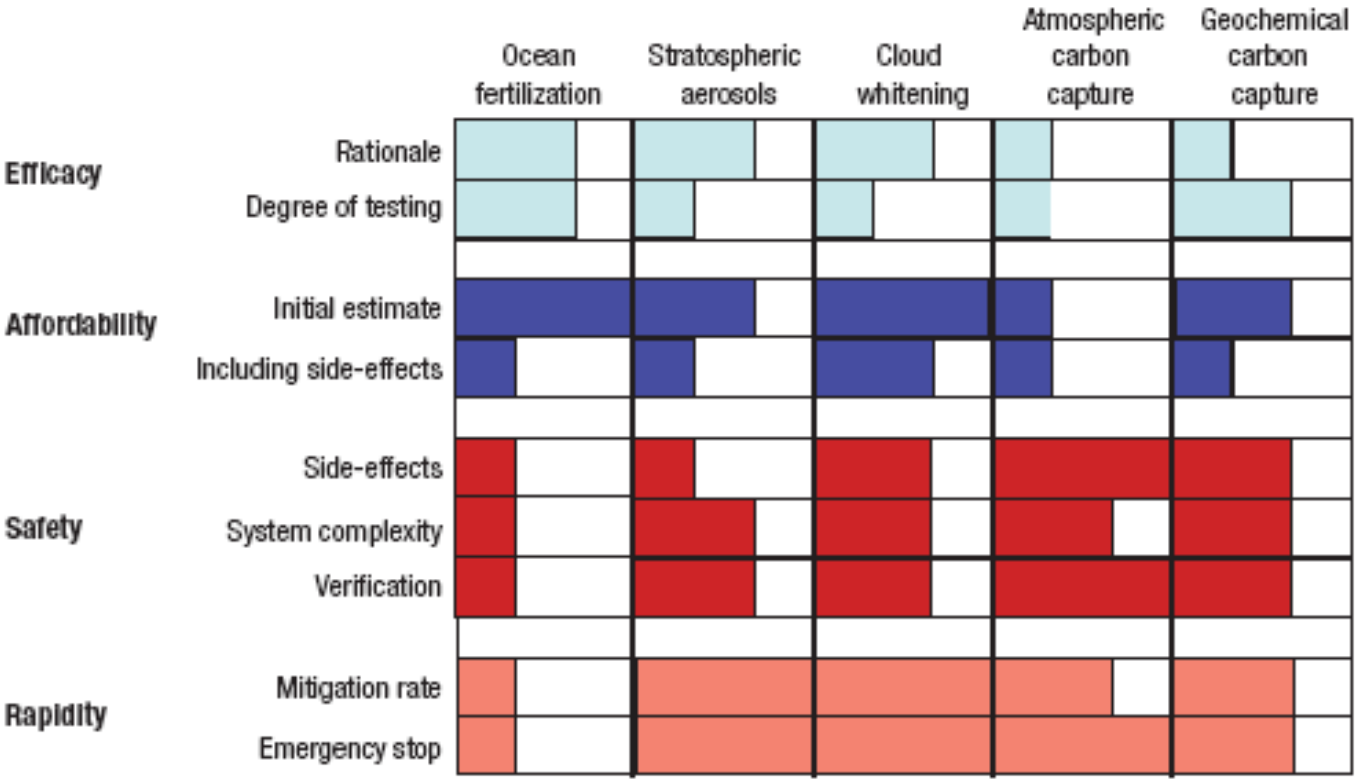
- Even out temperature differences that can drive disruptive weather and water events
- Example: ocean heat pumps driven by wave energy



Comparison of Climate Engineering Options and Risks



Comparisons of climate change methods



Likely future path?

- Increased interest in research and field tests
- Focused efforts to draft governance framework
- Likely to see unexpected collateral issues (water access, favorable climate change effects)

Questions?

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